

# Determinants of Mother to Child HIV Transmission (HIV MTCT); A Case Control Study in Governmental Health Centers of East Gojjam Zone, Northwest Ethiopia, 2019

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## Research

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# Abstract

**Background:** Mother to child human immune virus (HIV) transmission is the passage of HIV from mother to her child during pregnancy, labor, delivery or breast-feeding. The objective of this study was to identify determinants of mother to child HIV transmission in Governmental health centers of East Gojjam Zone, Northwestern Ethiopia, 2019.

**Methods:** A case control study was conducted on 210(42 cases and 168 controls). All cases were included in the study. Controls were selected by simple random sampling. Secondary data were collected from April 1 to 30/2019. Collected data were entered by using epi data version 3.1 and then it was exported to SPSS. The exported data was analyzed and presented by using descriptive summary statistics and tables. After bivariate logistic regression analysis, all variables with p-value  $\geq 0.05$  were entered into multivariable logistic regression and p value  $< 0.05$  considered as significantly associated with the outcome variable.

**Results:** Having history of antenatal care follow up of HIV positive pregnant women [ adjusted odds ratio (AOR)=5.0;95%CI; 2.02-12.16] and initial CD4 count of mothers [AOR=2.7;95%CI;1.35-5.52].

**Conclusion:** Mother to child HIV transmission was significantly associated with history of ANC follow up of mothers and initial CD4 counts of mothers.

## Background

Mother to child human immune virus (HIV) transmission is the passage of HIV from mother to her child. It is also the primary method of infection among children [1]. This transmission will occur during pregnancy, labor and delivery, or breastfeeding. Without intervention, about 15-30% of babies born to HIV positive women will be infected with HIV during pregnancy and at birth. A further 5-20% of 18-24 months' children will become infected through breastfeeding. More than half of postnatal transmission through breast feeding to 18-24 months occurs during the first 6 months of life [2, 3].

These burdens account especially 22 countries, from these Ethiopia is one of the priority countries where one of every 3 children born from women living with HIV. The Government has been accelerating to expand the prevention of mother to child transmission (PMTCT) of HIV service by endorsing with antenatal care free of charge [4]. To eliminate infection in children and keep mothers alive, a comprehensive package of interventions accelerating, including preventing of women from becoming infected with HIV, protect unwanted pregnancy, (PMTCT) throughout pregnancy, provide skilled delivery, exclusive breastfeeding and providing appropriate HIV treatment, care, and support for mother and infants [5]. Moreover, in 2013, all pregnant women have been considered eligible to start long-term antiretroviral therapy (ART) through a package is called option B+ which has a great role to ensure prevention of at least 98 percent of mother to child transmission of HIV (PMTCT) [6].

Globally, one million HIV exposed infants born with HIV infected women every year [7, 1]. There are approximately 1.4 million HIV positive women who become pregnant and contribute to more than 300,000 neonatal and fetal deaths each year in the world [8].

According to world health organization 2010 report, the prevalence of HIV in infants who are born from HIV positive mothers they attend both on treatment and prophylaxis was 10.9% [9]. Globally, 3.2 million Children living with HIV are 91% live in sub-Saharan Africa 6% living Asia and Pacific; the remaining 3% are situated in the rests of the world [10, 11].

Infants are infected with HIV at least 1600 every day and more than 600,000 infants are infected by the virus annually mostly in developing countries mainly in sub-Saharan Africa (12). In Ethiopia, an estimated 1.2 % of pregnant women are living with HIV consequently one of every three children born to this woman is being infected with HIV [10].

In Ethiopia, despite the availability and scale-up of life-saving interventions, only 24% of 13000 pregnant women living with HIV have been receiving the medication to prevent MTCT of HIV even women who utilize skilled delivery services are 12 % [13]. The aim of this study was to identify determinants of mother to child HIV transmission.

## Methods

### Study setting and period

Institution based case control study design was conducted from January 1 to 30/ 2019 in government health centers of East Gojjam Zone, Northwest Ethiopia. Current data shows that in regional health bureau numbers of pregnant women tested and know their result during pregnancy, labor, delivery and post-partum period is 452,566. In third quarter of 2009 annual report was number of HIV exposed infants who were receiving ARV prophylaxis is 2,019 and HIV confirmatory (antibody test) by 18 months is 2,122 among these 58 were HIV positive. In our study area total population 221,991 among these the reproductive age women are 63,000

All HIV positive infants were included in the study. Controls were selected by simple random sampling. A double population proportion formula using the proportion of HIV positive infants from HIV positive mothers and attended on PMTCT the prevalence was 10.1%; it is taken from institutional based quantitative study done in South Gondar zone in 2014. So, we were taking p-value= 0. 101. But to more representative we took P=0.5

In the study area, there were eight health centers.

Structural extracted data tools that help to collect secondary data in 8 health centers which gave PMCT service in East Gojjam Zone health facilities, before collection of data, discuss about how data were collected, and data collection training for half a day by PMTCT service provider for data collectors and

the data extract tool also prepared according to record log books and from previous researches. In our study, the data were extracted from the document of Hospital and health center ART register book, ANC follow up register book, PMTCT service registration log book charts and infant DBS tally sheets. Our data assurance was closely followed by both the Supervisor and data collectors that was contribute for quality of the study. Maintenance of privacy and confidentiality of the data was secured. And there was a good communication skill between data collectors and supervisor. Every day all quaternaries were reviewed and checked at the end of data\*-collection and any error was corrected. Daily checking of missing values and incomplete +data was done in order to enhance the quality of data. Prey test was done in 5% of the samples to cheek the quality of questioners from other than our samples

Health institution-based case control study design was conducted using data from the registration books and follow up log books in the PMTCT and HIV exposed infants (HEI) follow up units. The data were collected from eight health centers that provide PMTCT Services and the data were clean and edit before entry and checking for correction. Collected data were entered by using epi data version 3.1 and then it was exported to SPSS. The exported data was analyzed and presented by using descriptive summary statistics, figures and tables. After bivariate logistic regression analysis, all variables with a p-value less than or equal to 0.25 was entered into multivariable logistic regression and p value  $\leq 0.05$  considered as significantly associated with the outcome variable.

## Results

In this study, the total participants were 210. Nearly three fourth, 31(73.8%) of cases whose mothers had history of antenatal care follow up (Table 1).

Table 1  
 Characteristics of study participants in East Gojjame Zone, Northwest Ethiopia, 2019

Variables		Respondent status	
		Cases (n)=42	Controls(n) =168
		N (%)	N (%)
Level of education	unable to read and write	9(21.4)	16(9.5)
	read and write but have no formal education	3(7.1)	26(15.5)
	Primary	14(33.3)	37(22.0)
	Secondary	8(19.0)	46(27.4)
	above secondary	8(19.0)	43(25.6)
Residence	Urban	32(76.2)	137(81.5)
	Rural	10(23.8)	31(18.5)
Sex of the infant	Male	22(52.4)	90(53.6)
	Female	20(47.6)	78(46.4)
Did the mother attend antenatal	Yes	31(73.8)	151(89.9)
	No	11(26.2)	17(10.1)
Partner tested	Yes	34(81.0)	161(95.8)
	No	8(19.0)	7(4.2)
Place of delivery	Health facility	38(90.5)	161(95.8)
	Home	4(9.5)	7(4.2)
Mode of delivery	spontaneous vaginal delivery	34(81.0)	145(86.3)
	caesarean section	7(16.7)	16(9.5)
	Others	1(2.4)	7(4.2)
First 6 month's feeding	Exclusive breast feeding	36(85.7)	146(86.9)
	Mixed feeding	6(14.3)	22(13.1)
Did the mothers Had ARV intervention	Yes	31(73.8)	167(99.4)
	No	11(26.2)	1(0.6)
Did child receive ARV prophylaxis	Yes	42(100.0)	166(98.8)
	No	0(0.0)	2(1.2)

Is the infant start CPT	Yes	40(95.2)	163(97.0)
	No	2(4.8)	5(3.0)
WHO clinical stage near/at delivery	stage 1	23(54.8)	110(65.5)
	stage 2	9(21.4)	22(13.1)
	stage 3	8(19.0)	29(17.3)
	stage 4	2(4.8)	7(4.2)
Maternal CPT started	Yes	29(69.0)	131(78.0)
	No	13(31.0)	37(22.0)
Mothers age group	<25 year	14(33.3)	37(22.0)
	25-35	23(54.8)	82(48.8)
	>35	5(11.9)	49(29.2)
Weight of new borne	<2500gram	9(21.4)	30(17.9)
	>=2500	33(78.6)	138(82.1)
Age enrolment	<=6 week	9(21.4)	49(29.2)
	>6 week	33(78.6)	119(70.8)
Age start CPT	<=6 week	9(22.5)	14(8.6)
	>6 week	31(77.5)	149(91.4)
CD4cat	>350	22(52.4)	47(28.0)
	<=350	20(47.6)	121(72.0)

In Multivariate logistic regression analysis, ANC follow up and CD4 count for mothers were significantly associated with HIV infection for exposed infants (Table 2).

Table 2

Multivariate logistic regression analysis of factors associated with HIV infection for exposed infants at governmental health facility in Bahir Dar city, Amhara region, Ethiopia, 2019

Variables		Respondents status		COR (95%CI)	AOR (95%CI)	P-value
		Cases	Controls			
Education Level	unable to read and write	9	16	1	1	0.087
	Read and write no formal education	3	26	3.0(0.76-11.90)	0.3(0.10-0.97)	0.045
	Primary	14	37	1.3(0.51-3.19)	1.2(0.28-5.24)	0.798
	Secondary	8	46	3.1(1.12-8.49)	0.5(0.17-1.24)	0.124
	Above secondary	8	43	3.2(1.15-8.80)	1.2(0.39-3.42)	0.788
Residence	Urban	32	334	1	1	0.396
	Rural	10	47	2.2(1.04-4.81)	0.7(0.27-1.69)	
ANC	Yes	31	352	1	1	0.000
	No	11	29	4.3(2.06-9.44)	5.0(2.02-12.16)	
Infant CPT	Yes	40	375	1	1	0.149
	No	2	6	0.3(0.06-1.64)	0.2(0.03-1.68)	
CD4 Count	>350	22	126	1	1	0.004
	≤350	20	255	0.4(0.24-0.85)	2.7(1.35-5.52)	

## Discussion

The result of this study showed that the proportion of HIV positive infants born from HIV positive mothers was 9.9 % (95%CI, 7.1% -12.8%). This finding is consistent with the study conducted in Brazil 9.16% [22], Amhara region 10.1% [27] and Gonder university referral hospital 10% [26]. This result is higher than the USAID report of 2016 in Uganda 2.9%, Namibia 4.1%, Swaziland 3.3% [18], and the USAID 2013 database in Botswana 2% [19]. The finding of this study is also higher than the study conducted in china 4.8% [20], Ethiopia 4.16% [23]. This discrepancy might be due to attributed by the different option of PMTCT intervention.

The result of this study is lower than USAID 2013 database of Congo 34%, Ethiopia 25% [19] and the study conducted in Dire Dawa 15.7% and Jima 17% [25]. This might be due to improvement for PMTCT intervention.

HIV exposed infants' mother who had not ANC follow up almost 5 times more likely their infants infected by HIV than who had ANC follow up. This might be due to ANC follow up will enable to provide PMTCT intervention which includes early identification of HIV positive mothers and initiation of ARV drugs. This is similar with the study conducted in Wello Dessie [30]. But this is discrepancy with the study done in Brazil [28], Jima Ethiopia [25] and Bishoftu hospital Ethiopia [29]. This discrepancy might be the result of integration of the PMTCT interventions with ANC services in option B+.

HIV exposed infants who born from mothers whose CD4 count  $\leq 350$  is almost 2.7 times more infected by HIV than infants born from mothers' CD4 count  $< 350$ . This might be due to higher viral load which increase HIV transmission from mother to infant.

## Conclusion

This study showed that high proportion of HIV infection among exposed infants in the study area. Infections with HIV among HIV exposed infants were positively associated with history of ANC follow up of their mothers and initial CD4 counts. Further effort is needed to address ARV intervention to all HIV positive pregnant women to improve CD4 count of HIV positive pregnant women.

Strong effort should be made to further increase the ANC service utilization of HIV positive pregnant women with the help of city health extension workers and mother support groups.

## Limitation Of The Study

This study did not generalize for all HIV exposed infants for whom mothers did not have health facility visit

## Declarations

- **Ethics approval and consent to participate**

Ethical approval was obtained from East Gojjam Zone Health department Multi sectorial taskforce. Permission letter was sought from this health department. Written and Verbal informed consent was obtained from each data clerk. The information obtained from the study participant was maintained its confidentiality by not writing name of the study participants on the questionnaire paper.

- Consent for publications: Not applicable
- Availability of data and material: The data sets generated during the current study are available from corresponding author on reasonable request.

- Competing interest: The author declares that there is no competing interest.
- Funding: Not applicable
- Author's contribution

MK wrote study design, data entry, analyzed the data, drafted paper, and read and approved the final manuscript.

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